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 $F[P(\theta,t)]$ $\theta \qquad x$ F(u,v) X-rays

2D FOURIER SLICE THEOREM

F[P(0, q, q, r, t)] = 2D Fourier transform of P(0, 4, 4, r, t) f(x,y,z) $P(\theta, \phi, \gamma, r, t)$ F(u,v,w) = 3D Fourier transform Surface of f(x,y,z) within F(u,v,w) out amples (0,4,4)

F19. 3

3D Fourier Slive Theorem

Compute F(u,v,w)] (3D Fourier transform of f(x,y,z), f(x,y,z) having an orientation (θ, ϕ, ϕ) Resample F(u,v,w) along a surface $S(\theta, \phi, \Psi, u', v')$ Compute inverse Fourier σ ε/ transform F-1 [S(0, 4, 4, u', v')] of resampled surface

F16 4

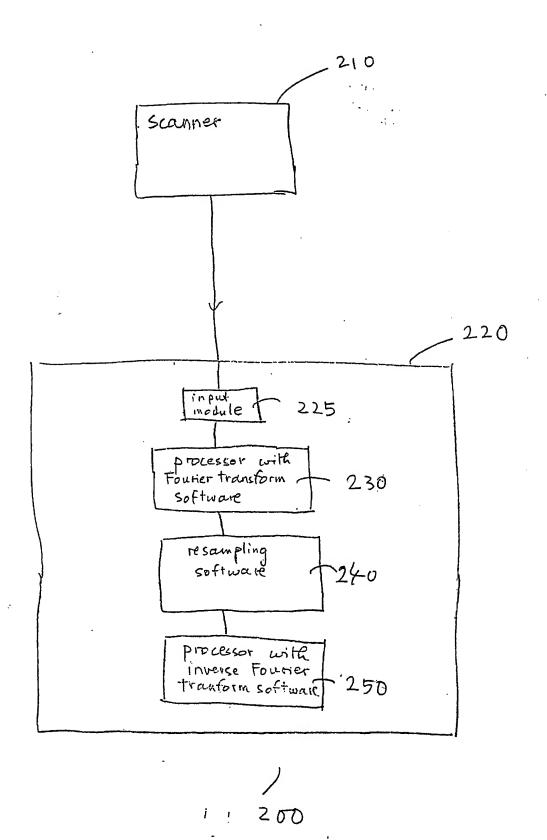


FIG. 6

Table 1 Comparison of computational complexity of new method with existing methods Computational Complexity (Number of computations)* СТ Computation advantage for Volume Current Methods new method (# of times faster) New Method (M=N=P) For each DRR For 100 DRRs For each DRR For 100 DRRs For each DRR For 100 DRRs 3-D FFT 32 262144 26214400 491520 18432 2334720 26.67 11.23 : 64 2097152 209715200 4718592 81920 12910592 57.60 16.24 128 16777216 1677721600 44040192 360448 80084992 122.18 20.95 256 134217728 13421772800 402653184 1572864 559939584 256.00 23.97 512 1073741824 1.07374E+11 3623878656 6815744 4305453056 531.69 24.94

FIG. 7

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